

What is claimed is:

1. A polarizing illumination optical system comprising, in order:

a light source that includes a parabolic reflector that defines an optical axis and a light emitter arranged at the focal point of said parabolic reflector so that said light source emits from the front of said light source a substantially collimated light beam that travels substantially parallel to said optical axis;

a polarization conversion optical system that receives said substantially collimated light beam and separates the light of said substantially collimated light beam into two light beams that are polarized in different directions, converts the polarization of one of said two light beams into the same polarization as the other of said two light beams, and emits both of said two light beams as two substantially collimated light beams in a direction substantially parallel to said optical axis;

wherein said polarization conversion optical system satisfies the following condition:

$$4 f < D < 7 f$$

where

f is the focal length of said parabolic reflector, and

D is the minimum width of the optical incidence aperture of said polarization conversion optical system; and

an integrator optical system that includes at least two integrating plates arranged in optical series that receives said two substantially collimated light beams from said polarization conversion optical system and produces from said two substantially collimated light beams a light beam more uniform in intensity in a cross-section perpendicular to said optical axis than either of said two substantially collimated light beams.

2. The polarizing illumination optical system of claim 1, wherein said polarization conversion optical system is arranged so that the optical axis defined by said parabolic reflector passes substantially through the center of said optical incidence aperture.

1 3. The polarizing illumination optical system of claim 1, wherein said polarization conversion
2 optical system includes at least one optical element that includes a polarizing beam splitter
3 element with a polarization splitting plane and a polarization rotation optical element that rotates
4 the direction of polarization of light of one light beam from said polarization splitting plane.

1 4. The polarizing illumination optical system of claim 2, wherein said polarization conversion
2 optical system includes at least one optical element that includes a polarizing beam splitter
3 element with a polarization splitting plane and a polarization rotation optical element that rotates
4 the direction of polarization of light of one light beam from said polarization splitting plane.

1 5. A projection display device comprising, in order:
2 the polarizing illumination optical system of claim 1;
3 at least one light modulator for modulating said light beam more uniform in intensity with
4 image information; and
5 a projection lens for projecting the light beam modulated by said at least one light
6 modulator in order to form an image corresponding to said image information.

1 6. A projection display device comprising, in order:
2 the polarizing illumination optical system of claim 2;
3 at least one light modulator for modulating said light beam more uniform in intensity with
4 image information; and
5 a projection lens for projecting the light beam modulated by said at least one light
6 modulator in order to form an image corresponding to said image information.

1 7. A projection display device comprising, in order:
2 the polarizing illumination optical system of claim 3;
3 at least one light modulator for modulating said light beam more uniform in intensity with
4 image information; and

5 a projection lens for projecting the light beam modulated by said at least one light
6 modulator in order to form an image corresponding to said image information.

1 8. A projection display device comprising, in order:

2 the polarizing illumination optical system of claim 4;

3 at least one light modulator for modulating said light beam more uniform in intensity with
4 image information; and

5 a projection lens for projecting the light beam modulated by said at least one light
6 modulator in order to form an image corresponding to said image information.

1 9. The polarizing illumination optical system of claim 2, wherein said polarization conversion
2 optical system includes two optical elements, each of which includes a polarizing beam splitter
3 element with a polarization splitting plane and a polarization rotation optical element that rotates
4 the direction of polarization of light of one light beam from said polarization splitting plane.

1 10. The polarizing illumination optical system of claim 9, wherein said two optical elements,
2 including their polarizing beam splitter elements, their polarization splitting planes, and their
3 polarization rotation optical elements, are symmetrically arranged on opposite sides of said
4 optical axis.

1 11. The projection display device of claim 6, wherein said polarization conversion optical
2 system includes two optical elements, each of which includes a polarizing beam splitter element
3 with a polarization splitting plane and a polarization rotation optical element that rotates the
4 direction of polarization of light of one light beam from said polarization splitting plane.

1 12. The projection display device of claim 11, wherein said two optical elements, including their
2 polarizing beam splitter elements, their polarization splitting planes, and their polarization
3 rotation optical elements, are symmetrically arranged on opposite sides of said optical axis.